

APPENDIX 2

Benefits of High-Performance Buildings

WHAT ARE THE BENEFITS OF HIGH-PERFORMANCE GREEN BUILDINGS?

ECONOMIC BENEFITS

Green building considers design and construction from wider point of view than bottom-line costs and profits. In today's market, this approach makes sense for companies able to consider a wider set of values in calculating benefits of a building as a strategic resource. They include:

1) REDUCED OPERATING COSTS

Operating costs include utilities such as energy, water and waste; repairs and replacement; maintenance staff; and management supervision. They account for approximately 5 times construction costs over the typical 60-year life of a building. Green Buildings are less costly to operate in multiple ways. They include:

Energy Efficiency

- Climate-sensitive design and energy technology use can cut heating and cooling energy consumption by 60 percent and lighting energy requirements by 50 percent in U.S. buildings.
- Returns on investment for energy-efficiency measures can be higher than rates of return on conventional and even high-yielding investments.

Water Efficiency

- Water-efficient appliances, fixtures, and irrigation methods can reduce consumption by up to 30 percent or more (an annual savings of \$4400 in a typical 100,000 sq ft office building).

Waste Reduction

- 35 to 40 percent of municipal solid waste is construction and demolition waste.
- In 1997, Portland's Rose Garden Arena project saved \$186,000 through waste diversion and construction site recycling.
- Recycling creates jobs. Diverting these materials to local processors instead of local landfills creates new economic opportunities.

Integrated Design

- Rehabilitating an existing building can lower infrastructure and materials costs.
- Integrated design can use the payback from some strategies to pay for others.
- Energy efficient buildings can reduce their equipment needs -- downsizing some equipment, such as chillers, or eliminating equipment, such as perimeter heating.
- Designing flexible interiors with underfloor air and cabling distribution systems, which can greatly reduce the time and materials needed to reconfigure the layout and infrastructure for offices (also known as "churn" costs).

2) INCREASED RETURN ON INVESTMENT

The initial capital costs and long-term operational and personnel costs of a building are affected by decisions made in the planning, programming, and design phases. In a typical commercial building over its lifetime, design and construction accounts for 2 percent, O and M accounts for 6 percent, and personnel accounts for 92 percent of total costs.

Costs can be significantly lowered by implementing better design and engineering that set environmental goals early in the project and integrate and calibrate systems. Many green building measures make good long-term economic sense if the first cost is subtracted from all future savings, and savings are calculated with market capitalization rates. In other words, many green measures can be thought of as investments that will gain value over time, over and above investments at market interest rates. Conversely, low up-front expenditures can often result in much higher costs over the life of a building.

3) INCREASED PRODUCTIVITY AND HUMAN HEALTH

In the US, Sick Building Syndrome and other building related illnesses are estimated to cost \$60 billion per year in medical expenses and lost worker productivity. Studies show that access to better light (daylighting) and indoor air quality makes for healthier working environments that can boost productivity from 5-15 percent (not including absenteeism and employee turnover). Linking energy efficiency and IAQ to employee productivity makes it possible to achieve deep energy savings (through lighting, efficient HVAC equipment, etc.) with paybacks of less than two years - a Return on Investment exceeding 50 percent. For example, improvements to an average office building that reduces energy use by 40 percent and increases employee productivity by 5 percent can save \$1 per square ft in annual energy costs and add more than \$10 per square ft in new profits.

4) ENHANCED IMAGE AND MARKETABILITY

Organizations that care about the environment and their workers enjoy a positive image. As sustainability, commitment to long-term success, and holistic thinking continue to emerge as important concepts in the business world, applying green design can position a company as a leader and innovator.

Marketability is directly affected in a leasing situation. The potential cost savings a building tenant can realize, through enhanced productivity and cheaper operations, makes a green building attractive. Building owners will find their green buildings in high demand for this reason.

Finally, case studies suggest that employers' ability to recruit and retain choice employees improve with a green building. Not only are green buildings self-evidently a desirable workplace for the employees, corporate commitment to the well being of its workers and to the environment encourage employee loyalty. For more information see Technical Resources economic benefits.

5) MEETING REGULATORY REQUIREMENTS

Compliance with local codes and regulations is a common function of design and construction. However, investors are increasingly concerned about how changing regulations affect their business investments. Green buildings are ahead of the curve in areas where regulations are likely in the future:

- Global warming and greenhouse gases
- Reduced ozone depletion
- Stormwater management
- Indoor air quality
- Toxic materials

6) REDUCED LIABILITY

The EPA ranks poor indoor air quality, which can lead to "Sick Building Syndrome" and building related illnesses as one of the top 5 environmental problems in the USA. Numerous legal cases have established that building owners and employers can be held liable for workers' compensation and health care costs brought about by sick buildings. Liabilities are resulting in larger compensation awards, reduce insurance coverage and greater exposure. Ironically, the EPA recently lost a \$1 million lawsuit to employees who became ill after new carpet was installed during a renovation.

The number of such sick building cases is on the rise, and the exact extent of this liability is still being established in the courts. Green building practices avoid these risks by:

- Providing cleaner indoor air
- Eliminating and reducing of hazardous materials
- Controlling moisture and mold

ENVIRONMENTAL BENEFITS

Land Use

In Portland, the efficient use and reuse of land for residential, commercial, and industrial activities within the Urban Growth Boundary has become critical as undeveloped land becomes scarcer. In addition, new development strategies are needed to heal local ecosystems altered from years of urbanization. Strategies include:

- Reducing sprawl with mixed use and increased densities.
- Restoring and redeveloping polluted brownfields.
- Reducing soil erosion.
- Restoring natural functions of rainwater and reducing pollution of surface water.
- Landscaping that re-establishes native species and requires less toxic chemicals and water.

Global Warming

Buildings are responsible for over 35 percent of the world's CO₂ emissions - the chief pollutant blamed for climate change (construction and operations). Impacts can be reduced by:

- Designing and operating buildings to use energy efficiently. Buildings can be cost-effectively designed to be 20-40 percent more energy-efficient than a conventional building.
- Producing on-site energy and/or purchasing green power.
- Reducing the number of trips by automobile by providing safe and healthy pedestrian and bicycle access.

Threatened and Endangered Salmon Habitat

Human activities threaten watershed health and aquatic habitat that salmon need to thrive. Land use, stormwater management, and water pollution are directly impacted by development. Green building techniques address these issues by:

- Preserving existing vegetation and cluster development to preserve streamside habitat.
- Minimizing impervious surfaces to decrease flooding and protect base stream flows.

- Amending landscape soils with compost to increase stormwater retention and reduce irrigation demand.
- Installing water efficient building systems to protect area water supplies and habitat areas.
- Using low toxic building materials that reduce water demand.
- Installing water efficient building systems to protect area water supplies and habitat areas.
- Using low toxic building materials that reduce water pollution during manufacturing and installation.
- Minimizing energy consumption and provide renewable on-site power generation in order to reduce demand for hydropower.
- Using sustainably certified lumber from the Pacific Northwest region.

Building Materials

Building materials make up 30 percent of raw materials consumption and 25 percent of timber harvests throughout the world. Impacts can be seen throughout the region from over-harvested forests to the toxic open pit mines. Strategies to minimize materials use and toxicity include:

- Using building materials that, in comparison to similar products, have a reduced effect on the environment by using life-cycle analysis (LCA) to quantify impacts over the life of the material.
- Reducing volume of material through efficient construction practices and using engineered and recycled content building products.

Solid Waste

Over 40 % of landfill waste is generated during building construction and demolition. Strategies to reduce waste and save money in unnecessary tipping fees include:

- Restoring and reusing older structures
- Carefully deconstructing structures that must be demolished
- Recycling construction waste
- Specifying salvaged and recycled-content framing

COMMUNITY BENEFITS

For many years, Portland has developed strategies to balance growth with the protection of natural resources. Promoting green buildings are part of this effort to protect and rehabilitate local ecosystems, promote smart growth, provide a range of transportation options, and enhance Portland's urban vitality. Green building help support the local economy through the demand for new products and services. New job opportunities are arising in areas of ecosystem services, stormwater management, energy-effective building design, renewable energy systems, and low-toxic, low-impact building materials.

Sources:

U. S. Green Building Council at <http://www.usgbc.org/>

Portland G-Rated Website, a nexus to green building expertise, at <http://www.green-rated.org/g Rated/grated.html>